LSU
LOUISIANA STATE UNIVERSITY

PHYSICS & ASTRONOMY
WEEKLY CALENDAR

TEL: 225-578-2261
FAX: 225-578-5855
http://www.phys.lsu.edu

202 NICHOLSON HALL
Louisiana State University
Baton Rouge, Louisiana 70803-4001

February 8, 2008

Departmental Colloquium

"Neutrino flavor-mixing-news from the frontier"

3:40 PM - Tuesday, February 12, 2007
109 Nicholson Hall

Christopher Mauger
California Institute of Technology

Host – William Metcalf

• Refreshments served at 3:15 PM in 201 Nicholson Hall •

Abstract

Chargeless and extremely light, neutrinos are nevertheless critical to our understanding of particle physics, astrophysics, and cosmology. The first evidence for physics beyond the standard model of particle physics came from neutrino oscillation experiments. Neutrinos allow us to directly probe stellar interiors and play a crucial role in supernova dynamics. Though their masses are small, they affect the large-scale structure of the universe. After a brief introduction to neutrino flavor-mixing and an update on the status of the field, I discuss the near-future directions of flavor-mixing physics and how those directions might impact our understanding of particle physics, astrophysics, and cosmology.

Departmental Colloquium

"Detecting Neutrinos from GRB's with IceCube"

3:40 PM - Thursday, February 14, 2007
109 Nicholson Hall

Ignacio Taboada
University of California-Berkeley

Host – William Metcalf

• Refreshments served at 3:15 PM in 201 Nicholson Hall •

Abstract

Forty years ago it was recognized that the detection of high energy (E > 1012 eV) neutrinos from astrophysical sources would require the construction of a device with 1 gigaton (or 1 cubic kilometer of ice) of target material. This idea is now becoming a reality at the South Pole with the construction of IceCube. Detection of extraterrestrial high energy neutrinos will open new avenues in astrophysics and neutrino physics. What is the origin of the highest energy cosmic rays? How do gamma-ray bursts (GRBs), the most powerful objects in the Universe, work? These are just some of the questions that IceCube will help answer. In this talk I will summarize the searches for neutrinos from GRBs with AMANDA, the predecessor (and now part) of IceCube. I will review the status of the construction and operation of IceCube. Finally, I will present preliminary results from IceCube.

Material Science and Engineering

"Quantum critical behavior in cuprate superconductors"

3:40 PM – Wednesday, February 13, 2008

109 Nicholson Hall

Thomas Lemberger

Ohio State University

Host – Ilya Vekhter

Abstract

The relationship between the transition temperatures TC and superfluid densities nS(0) of cuprate superconductors has been a central issue in cuprate superconductivity from the beginning. When mobile holes are removed from optimally doped CuO2 planes, TC and nS(0) decrease in a surprisingly correlated fashion. Recent measurements of the superfluid density of strongly underdoped YBa2Cu3O7-d films and crystals have found a square-root scaling, TC μ nS(0)a where a ≈ 1/2, which supplants the approximately linear proportionality that had been deduced long ago from less underdoped samples by Uemura et al. and had been ascribed to the quasi-2D structure of cuprates. We measured nS(T) in films of Y1-xCaxBa2Cu3O7-d as thin as two CuO2 bilayers. TC's were as low as 3 K. We observed the 2D Kosterlitz–Thouless–Berezinski drop in nS at TC, and we recovered the linear scaling TC μ nS(0) expected in 2D due to fluctuations in the phase of the superconducting order parameter. Taken together, results on 3D and 2D samples suggest that the disappearance of superconductivity with underdoping is ultimately due to quantum fluctuations near a quantum critical point.

Saturday Science

"Fog and Air Pollution"

10:00 – 11:30 - Saturday, February 16, 2008

Room 130 Nicholson Hall

Kalliat Valsaraj – Chemical Engineering – LSU

Host – Ravi Rau

Publications:

"Uniform discretizations: a quantization procedure for totally constrained systems including gravity," Miguel Campiglia, Cayetano Di Bartolo, Rodolfo Gambini, and Jorge Pullin, Journal of Physics: Conference Series **67** (2007) 012020.